

Total No. of Printed Pages—8

**6 SEM TDC CHM M 3 (N/O)**

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( May )

**CHEMISTRY**

( Major )

Course : 603

**( Inorganic Chemistry—III )**

*The figures in the margin indicate full marks  
for the questions*

( New Course )

Full Marks : 48

Pass Marks : 14

Time : 2 hours

1. Choose the correct answer :

1×5=5

(a) Non-heme iron protein is

- (i) hemoglobin
- (ii) myoglobin
- (iii) hemerythrin
- (iv) cytochrome P-450

(b) The function of plastocyanin is

- (i) oxidation of L-ascorbic acid
- (ii) electron transfer in plants
- (iii) oxidation of primary amine
- (iv) oxygen transport

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**( Turn Over )**

( 2 )

- (c) The formula of kaolinite clay is
- (i)  $\text{Al}_2\text{O}_3 \cdot \text{K}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$
  - (ii)  $\text{Al}_2\text{O}_3 \cdot \text{Na}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$
  - (iii)  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$
  - (iv)  $\text{Al}(\text{OH})_3 \cdot \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- (d) Paper chromatography is more suited to
- (i) partition
  - (ii) molecular sieving
  - (iii) ion exchange
  - (iv) adsorption
- (e) In 1952, the 'Minamata' disease in Japan was caused by poisoning effect of
- (i) Pb
  - (ii) Cd
  - (iii) Hg
  - (iv) As

UNIT—I

2. (a) Answer any three questions :  $4 \times 3 = 12$
- (i) Describe the role of copper in biological system. 4
  - (ii) What are the functions of hemoglobin and myoglobin? What are the principal similarities in their structures?  $3 + 1 = 4$
  - (iii) What is carboplatin? Give one of its uses. What are its advantages over those of cis-platin?  $1 + 1 + 2 = 4$

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- (iv) Explain one function of each of the following metals in biological system :  $2 \times 2 = 4$
- (1) Molybdenum
  - (2) Magnesium
- (b) Write a note on any one of the following : 2
- (i) Nitrogenase
  - (ii) Chelation therapy

UNIT—II

3. (a) Answer any three questions :  $3 \times 3 = 9$
- (i) Discuss about the advantages of solid-state reaction with the help of two examples. 3
  - (ii) What are the supramolecular interactions? Give two examples. 3
  - (iii) Mention the two basic approaches for synthesis of nanomaterials. Name the two characterization techniques for nanomaterials.  $1\frac{1}{2} + 1\frac{1}{2} = 3$
  - (iv) What are clay minerals? Give the formula and uses of montmorillonite clay.  $1 + 2 = 3$
- (b) Mention two applications of nanomaterials. 2

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UNIT—III

4. (a) Describe the principle and application of paper chromatography. 3

Or

Define the terms 'stationary phase' and 'mobile phase' in chromatographic process. Name the phases used in TLC.

2+1=3

- (b) Write a short note on any one of the following : 2

- (i) Principles of gas chromatography
- (ii) Advantages of TLC over paper chromatography

UNIT—IV

5. (a) Answer any three questions : 3×3=9

(i) What do you mean by setting of cement? Write down the reactions involved in it. 1+2=3

(ii) What are paints? Mention the names of essential parts of a paint. What is the role of a binder?

1+1+1=3

(iii) What is demineralized water? Describe a method of demineralization of water. 1+2=3

(iv) Discuss the poisoning effect of mercury (Hg) on human body. 3

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- (b) Write short notes on any two of the following : 2×2=4

- (i) Glazing compounds of ceramics
- (ii) Role of thinner in paint industry
- (iii) Hazard from radioactive fallout
- (iv) Composition of cement

( Old Course )

Full Marks : 48

Pass Marks : 19

Time : 3 hours

1. Choose the correct answer : 1×5=5

(a) Which of the following enzymes do not have heme group?

- (i) Hemoglobin
- (ii) Ferredoxin
- (iii) Cytochrome oxidase
- (iv) Catalase

(b) Which vitamin is known as cyanocobalamin?

- (i) B<sub>6</sub>
- (ii) B<sub>12</sub>
- (iii) K
- (iv) C

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- (c) Which technique is used for the characterization of nanomaterials?
- (i) SEM
  - (ii) AFM
  - (iii) XRD
  - (iv) All of the above
- (d) The stationary phase in adsorption chromatography is
- (i) liquid
  - (ii) solid
  - (iii) gas
  - (iv) colloid
- (e) Minamata disease is caused by poisoning of
- (i) Pb
  - (ii) Hg
  - (iii) Cd
  - (iv) As

UNIT—I

2. Answer any *three* questions :  $2 \times 3 = 6$
- (a) What is plastocyanin? Mention its function in plant body.  $1+1=2$
  - (b) How does myoglobin help in oxygen storage and transport? 2
  - (c) Write a note on nitrogen fixation. 2
  - (d) Mention the function of Zn in biological system. 2

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( Continued )

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3. (a) Explain the role of Na and K in biological system. 3
- (b) Write short notes on any *two* of the following :  $2\frac{1}{2} \times 2 = 5$
- (i) Chelation therapy
  - (ii) Metalloenzyme
  - (iii) Vitamin B<sub>12</sub>

UNIT—II

4. Answer any *three* questions :  $3 \times 3 = 9$
- (a) What do you mean by non-covalent interactions? Give two examples.  $1+2=3$
  - (b) How are nanomaterials classified? Give examples. 3
  - (c) What are clay minerals? Mention the typical formula of kaolinite clay and its one application.  $1+1+1=3$
  - (d) How is solid-state reaction more advantageous over other conventional routes? Give one example.  $2+1=3$

UNIT—III

5. Answer the following questions :  $3 \times 3 = 9$
- (a) What are 'stationary phase' and 'mobile phase' in chromatographic process? Name the phases used in column chromatography.  $1+2=3$

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- (b) What kind of information do you get from AAS? Give examples of one auxochrome and one chromophore.  $1+2=3$
- (c) Describe the technique adopted in paper chromatography. How TLC has more advantage over paper chromatography? What is FTIR?  $1+1+1=3$

Or

Write notes on the following :  $1\frac{1}{2}\times 2=3$

- (i) Thin-layer chromatography  
(ii) Molecular fluorescence spectroscopy

#### UNIT—IV

6. Answer the following questions :

- (a) Name three important constituents of paints. Write about the coloured pigments used in paint industry.  $1\frac{1}{2}+1\frac{1}{2}=3$
- (b) What are the basic raw materials used for the manufacture of cement? Write the composition of Portland cement. Mention the role of gypsum in cement industry.  $1+1+1=3$
- (c) Write short notes on any *two* of the following :  $2\frac{1}{2}\times 2=5$
- (i) Principle of green chemistry  
(ii) Pb poisoning  
(iii) Hazard from radioactive fallout

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